

**CLAIMS**

1. A method of activating a printing element within an array of printing elements on a printhead of an inkjet printer comprising:
- (a) providing a plurality of printing elements,
  - (b) providing a plurality of power switching devices coupled to the  
5 plurality of printing elements, each power switching device having a power source, power drain, and power gate,
  - (c) providing a plurality of pass switching devices, each pass switching device coupled to a corresponding power switching device, each pass switching device having a pass source, pass drain,  
10 and a pass gate,
  - (d) providing one or more ground switching devices, the one or more ground switching devices having a ground source, ground drain, and ground gate, where the pass drain of each pass switching device is connected to the power gate of a  
15 corresponding one of the power switching devices, where a ground drain of the one or more one ground switching devices is coupled to one or more power sources of one or more of the power switching devices, and where the power source of each power switching device is connected to a corresponding one of  
20 the printing elements,
  - (e) defining a plurality of groups of printing elements and associated pass switching and power switching devices,
  - (f) within each group defining a plurality of subsets of printing elements and associated pass switching devices,
  - (g) providing a subset selection signal to the pass switching devices and  
25 power switching devices of a selected one of the subsets to thereby select a subset of printing elements in the array of printing elements based on the subset selection signal,

- 30 (h) providing an address signal to a selected subset of the pass switching devices to thereby select a one or more printing elements based on the address signal,
- (i) providing a heater select signal to one or more of the ground switching devices,
- 35 (j) providing a primitive signal to a select one of the groups of printing elements on the printhead, and
- (k) activating a selected printing element within the select group based on the primitive signal and the heater select signal.

2. The method of claim 1, wherein:

step (g) includes providing the subset selection signal to the pass and power gates of the pass switching devices and power switching devices within the subset and setting the subset selection signal high on the pass and power gates of the pass  
5 switching devices and power switching devices within the subset.

3. The method of claim 1, wherein:

step (h) includes providing the address signal to the pass sources of the pass switching devices within the selected subset and setting the address signal high on the pass sources of the pass switching devices within the selected subset.

4. The method of claim 1, wherein:

step (i) includes providing the heater select signal to one or more gates of the one or more of the ground switching devices and setting the heater select signal high on the one or more gates of the ground switching devices, and

5 step (j) includes setting the primitive signal high on the printing element.

5. An integrated circuit for controlling a printing operation of an inkjet printhead based on first, second, third, and fourth control signals provided by a printer controller, the integrated circuit comprising:

a plurality of printing elements arranged in selectable groups for printing an  
5 image on a print medium,

a plurality of power switching devices, each coupled to a corresponding one of the printing elements,

a plurality of pass switching devices, each coupled to a corresponding one of the power switching devices,

10        one or more ground switching devices coupled to one or more of the power switching devices,

$p$  number of first control lines each coupled to a corresponding one of the selectable groups of printing elements, each first control line for providing the first control signal to one or more of the selectable groups of printing elements, thereby  
15        selectively enabling activation of one or more of the selectable groups of the printing elements,

$q$  number of second control lines each coupled to a corresponding selectable subset of power switching devices and pass switching devices within one or more of the selectable groups of printing elements, each second control line for providing the  
20        second control signal to the corresponding selectable subset of power switching devices and pass switching devices, the second control lines for selectively enabling activation of the corresponding subset of power switching devices and pass switching devices within the one or more selectable groups,

$a$  number of third control lines, each coupled to corresponding pass switching  
25        devices within each subset of printing elements, the third control lines for providing the third control signal to the corresponding selectable subset of pass switching devices, the third control signal for selectively enabling activation of one of the printing elements within the corresponding selectable subset, and

$h$  number of fourth control lines coupled to the one or more of the ground  
30        switching devices, the fourth control lines for providing the fourth control signal to the one or more ground switching devices, the fourth control signal for selectively activating the one or more of the ground switching devices to connect the one or more power switching devices to ground, thereby activating a selected printing element within the selected subset of printing elements.

6.        The integrated circuit of claim 5 further comprising:

      each pass switching device having a pass gate, pass source, and pass drain,

      each power switching device having a power gate, power source, and power drain, and

5           the one or more ground switching devices each having a ground gate, ground source, and ground drain.

7.       The integrated circuit of claim 6 further comprising:

          a plurality of control switching circuits corresponding to the plurality of pass switching devices and power switching devices, each control switching circuit having an input and first and second outputs, the input of each control switching circuit  
5       electrically connected to a corresponding one of the second control lines,

          the pass gate of each pass switching device electrically connected to the first output of the control switching circuit,

          the pass drain of each pass switching device electrically connected to a power gate of a corresponding one of the power switching devices,

10       the pass source of each pass switching device electrically connected to a corresponding one of the third control lines,

          the power gate of each power switching device electrically connected to the second output of the control switching circuit,

          the power drain of each power switching device electrically connected to one  
15       side of a corresponding printing element,

          the power source of each power switching device electrically connected to the ground drain of a corresponding ground switching device,

          each ground gate of the one or more ground switching devices electrically connected to a corresponding one of the fourth control lines, and

20       each ground source of the one or more ground switching devices electrically connected to ground.

8.       The integrated circuit of claim 7 further comprising:

          the control switching circuit for providing the second control signal to the pass gate of each pass switching device,

          each pass switching device for providing the second control signal to a power  
5       gate of a corresponding one of the power switching devices, thereby selectively activating the power gate of each power switching device.

9. The integrated circuit of claim 5 further comprising a one to one correspondence between the ground and power switching devices.

10. The integrated circuit of claim 5 further comprising one ground switching device electrically connected to each power switching device.

11. The integrated circuit of claim 5, wherein  $p$  equals sixteen,  $q$  equals four,  $a$  equals five, and  $h$  equals 2, corresponding to an addressing arrangement capable of selectively activating six-hundred and forty printing elements.

12. The integrated circuit of claim 5, wherein  $p$  equals sixteen,  $q$  equals one,  $a$  equals ten, and  $h$  equals 4, corresponding to an addressing arrangement capable of selectively activating six-hundred and forty printing elements.

13. The integrated circuit of claim 5, wherein  $p$  equals one,  $q$  equals four,  $a$  equals ten, and  $h$  equals sixteen, corresponding to an addressing arrangement capable of selectively activating six-hundred and forty printing elements.

14. An ink jet printer comprising:

a printer controller for generating print signals,

a printhead for generating a printed image on a print medium, the printhead including:

5 a plurality of printing elements arranged in selectable groups for printing the image on the print medium,

a plurality of power switching devices, each coupled to a corresponding one of the printing elements,

a plurality of pass switching devices, each coupled to a corresponding one of the power switching devices,

10 one or more ground switching devices coupled to one or more of the power switching devices,

$p$  number of first control lines each coupled to a corresponding one of the selectable groups of printing elements, each first control line for providing the first

15 control signal to one or more of the selectable groups of printing elements, thereby

selectively enabling activation of one or more of the selectable groups of the printing elements,

20  $q$  number of second control lines each coupled to a corresponding selectable subset of power switching devices and pass switching devices within one or more of the selectable groups of printing elements, each second control line for providing the second control signal to the corresponding selectable subset of power switching devices and pass switching devices, the second control lines for selectively enabling activation of the corresponding subset of power switching devices and pass switching devices within the one or more selectable groups,

25  $a$  number of third control lines, each coupled to corresponding pass switching devices within each subset of printing elements, the third control lines for providing the third control signal to the corresponding selectable subset of pass switching devices, the third control signal for selectively enabling activation of one of the printing elements within the corresponding selectable subset, and

30  $h$  number of fourth control lines coupled to the one or more of the ground switching devices, the fourth control lines for providing the fourth control signal to the one or more ground switching devices, the fourth control signal for selectively activating the one or more of the ground switching devices to connect the one or more power switching devices to ground, thereby activating a selected printing  
35 element within the selected subset of printing elements.

15. The printer of claim 14, wherein the printhead further comprises:

each pass switching device having a pass gate, pass source, and pass drain,

each power switching device having a power gate, power source, and power drain, and

5 the one or more ground switching devices each having a ground gate, ground source, and ground drain.

16. The printer of claim 15, wherein the printhead circuit further comprises:

a plurality of control switching circuits corresponding to the plurality of pass switching devices and power switching devices, each control switching circuit having an input and first and second outputs, the input of each control switching circuit  
5 electrically connected to a corresponding one of the second control lines,

the pass gate of each pass switching device electrically connected to the first output of the control switching circuit,

the pass drain of each pass switching device electrically connected to a power gate of a corresponding one of the power switching device,

10 the pass source of each pass switching device electrically connected to a corresponding one of the third control lines,

the power gate of each power switching device electrically connected to the second output of the control switching circuit,

15 the power drain of each power switching device electrically connected to one side of a corresponding printing element,

the power source of each power switching device electrically connected to the ground drain of a corresponding ground switching device,

each ground gate of the one or more ground switching devices electrically connected to a corresponding one of the fourth control lines, and

20 each ground source of the one or more ground switching devices electrically connected to ground.

17. The printer of claim 16, wherein the printhead further comprises:

the control switching circuit for providing the second control signal to the pass gate of each pass switching device,

5 each pass switching device for providing the second control signal to a power gate of a corresponding one of the power switching devices, thereby selectively activating the power gate of each power switching device.

18. The printer of claim 14, wherein  $p$  equals sixteen,  $q$  equals four,  $a$  equals five, and  $h$  equals 2, corresponding to an addressing arrangement capable of selectively activating six-hundred and forty printing elements.

19. The printer of claim 14, wherein  $p$  equals sixteen,  $q$  equals one,  $a$  equals ten, and  $h$  equals 4, corresponding to an addressing arrangement capable of selectively activating six-hundred and forty printing elements.

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20. The printer of claim 14, wherein  $p$  equals one,  $q$  equals four,  $a$  equals ten, and  $h$  equals sixteen, corresponding to an addressing arrangement capable of selectively activating six-hundred and forty printing elements.